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10/725,175	12/01/2003	Richard L. Baer	10021082-1	2056

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AGILENT TECHNOLOGIES, INC.
Legal Department, DL 429
Intellectual Property Administration
P.O. Box 7599
Loveland, CO 80537-0599

EXAMINER

RAO, ANAND SHASHIKANT

ART UNIT	PAPER NUMBER
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2621

MAIL DATE	DELIVERY MODE
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02/22/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/725,175

Applicant(s)

BAER, RICHARD L.

Examiner

Andy S. Rao

Art Unit

2621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11/20/07.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date: _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date: _____ | 6) <input type="checkbox"/> Other: _____ |

Art Unit: 2621

DETAILED ACTION

Response to Amendment

1. Applicant's arguments filed on 11/20/07 with respect to claims 1-25 have been fully considered but they are not persuasive.
2. The Applicant presents two substantive arguments contending the Examiner's rejections of claim 17 under 35 U.S.C. 102(e) as being anticipated by Neubauer et al., (hereinafter referred to as "Neubauer"), of claims 1-4, 7-8, and 11-25 under 35 U.S.C. 103(a) as being unpatentable over Neubauer et al., (hereinafter referred to as "Neubauer"), and of claims 5-6 and 9-10 under 35 U.S.C. 103(a) as being unpatentable over Neubauer et al., (hereinafter referred to as "Neubauer") in view of Burns et al., (hereinafter referred to as "Burns"), as was set forth in the Office Action of 8/23/07, said arguments being presented in support of the currently amended claims 1-25. However, after a careful consideration of the arguments presented, and further scrutiny of the Neubauer and Burns references, the Examiner must respectfully disagree and maintain the applicability of the references as the basis of the grounds of rejection that follow.

After summarizing the current stage of prosecution and establishing the legal basis for Applicant's arguments (Amendment of 11/20/07: page 7, lines 1-20), highlighting the salient features of now amended claim 17 (Amendment of 11/20/07: page 7, lines 21-25), and providing Applicant's interpretation of the applied Neubauer reference (Amendment of 11/20/07: page 8, lines 1-10), the Applicant argues that Neubauer fails to disclose "...limiting the image processing to less than the field of view of image capture device..." limitation (Amendment of 11/20/07: page 8, lines 11-18) of the claim. The Examiner respectfully disagrees. It is noted that Neubauer is careful to disclose *extracting only the relevant image features from a target image within an*

Art Unit: 2621

ROI (region of interest) for the predetermined marker search (Neubauer: column 4, lines 63-77).

As such, only the markers within the search ROI are used for template comparison and not the whole image of the PCB. The disclosure of this marker specific extraction process prior to the template search is seen to read upon the "...limiting..." feature of the claim. Additionally, it is noted that the processing of marker searches which cover the entire field of view is doable, but highly unusual requires specific correlation processing (Neubauer: column 6, lines 40-45). However, the incorporation of the "map" feature in the language of the claims changes the application of Neubauer as the basis of the grounds of rejection under 35 U.S.C. 103(a) and appears below.

The Applicant's remarks concerning Burns are accurate but do not advance the argument that it could or should not be combined with the primary Neubauer reference (Amendment of 11/20/07: page 9, lines 19-28), and only posit that the features in Burns as disclosed don't provide sufficient basis for anticipation to which Examiner concurs.

After establishing the legal basis for the Applicant's argument (Amendment of 11/20/07: page 9, lines 1-10; page 10, lines 9-19), reciting the salient features of amended claim 1 (Amendment of 11/20/07: page 9, lines 11-17), summarizing the Examiner's applied reasoning of Neubauer (Amendment of 18-22), the Applicant argues that even with the modification the primary reference, the rejection fails to teach or suggest all of the claim limitations because of three factors. The Examiner respectfully disagrees. Firstly, it appears that somehow the Examiner's reliance on the use of Neubauer's teaching of irregularly shaped regions of interest is felt to somehow distinguish the claimed regions of interest in the claims (Amendment of 11/20/07: page 9, lines 23-24). The Examiner would respectfully disagree and note that the

Art Unit: 2621

claims don't define the nature or configuration the ROIs therefore even if they are irregularly shaped, they can be applied to the claims in question. Also the fact that the Examiner looked to the reference's teaching and found a teaching that was not a concern of the instant invention just goes to show that improper hindsight was not used in making the modification. Secondly, the Applicant's argue that "...retrieving image data associated with only the selected pixels defined in the map..." limitation (Amendment of 11/20/07: page 9, lines 25-27; page 19, lines 1-2) of the claim. The Examiner respectfully disagrees. It is noted that Neubauer is careful to disclose *extracting only the relevant image features from a target image within an ROI* (region of interest) for the predetermined marker search (Neubauer: column 4, lines 63-77). As such, only the markers within the search ROI are used for template comparison and not the whole image of the PCB. The disclosure of this marker specific extraction process prior to the template search is seen to read upon the "...retrieving..." feature of the claim. Additionally, it is noted that the processing of marker searches which cover the entire field of view is doable, but highly unusual requires specific correlation processing (Neubauer: column 6, lines 40-45). Lastly, the Applicants argue that the templates/maps of Neubauer do not identify regions of interest as in the claims but instead define if an expected result determine if a captured image includes a desired marker (Amendment of 11/20/07: page 10, lines 3-7). What the Applicant is referring to is the training process for evaluating marker presence or not (Neubauer: column 4, lines 37-59). Once the templates are formed through training, then they are actually used to determine whether PCBs do actually contain ROI specific markers by extraction of the only the marker specific pixels for template/map comparison (Neubauer: column 4, lines 60-65). Accordingly, for the reasons discussed above, the Examiner maintains that the modification to Neubauer is proper.

Art Unit: 2621

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-4, 7-8, and 11-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Neubauer et al., (hereinafter referred to as "Neubauer").

Neubauer discloses a camera (Neubauer: figure 5), comprising: an image sensor including pixels for capturing an image (Neubauer: column 3, lines 55-57) in a field of view (Neubauer: column 6, lines 40-45) and producing image data corresponding to the image (Neubauer: column 3, lines 58-63); a memory storing one or more pre-defined regions of interest within the field of view (Neubauer: column 4, lines 65-67; column 5, lines 1-5: multiple "marker specific ROIs) selected ones of the pixels (Neubauer: column 3, lines 64-67); and an access controller configured to retrieve the image data associated with only (Neubauer: column 4, lines 63-65: "...extracting the relevant image features from a target image within a ROI...") the selected pixels (Neubauer: column 4, lines 1-3), as in claim 1. However, Neubauer doesn't explicitly disclose the use of an ROI map as in the claims. But Neubauer discloses the use of ROI template generation based (Neubauer: column 4, lines 4-28) on ROI histograms (Neubauer: column 4, lines 60-67; column 5, lines 1-46) constructed from PCB marker identification (Neubauer: column 4, lines 37-50) in order to accurately predict and classify irregularly shaped PCB features with optimal results (Neubauer: column 7, lines 15-23), especially since the ROI

Art Unit: 2621

histograms are evaluated on a global scale in accordance with Euclidean distance parameters corresponding to each respective marker (Neubauer: column 7, lines 55-67; column 8, lines 1-27). Accordingly, given the teaching of the Neubauer ROI histograms, it would have been obvious for one of ordinary skill in the art at the time of the invention to associate the ROI histograms of Neubauer with the claimed ROI maps of the instant invention in order to use said map associated ROI histograms to accurately predict and classify irregularly shaped PCB features with optimal results, especially since both would contain the spatial distribution of PCB markers across a field of view of the camera (Neubauer: column 7, lines 35-47). The Neubauer system, now incorporate the map associated ROI histograms as discussed above, has all of the features of claim 1.

Regarding claim 2, the Neubauer system, now incorporate the map associated ROI histograms as discussed above, has an additional memory for storing the image data corresponding to the image, said access controller being configured to access said additional memory to retrieve the image data associated with the selected pixels (Neubauer: column 3, lines 55-67), as in the claim.

Regarding claims 3-4, the Neubauer system, now incorporate the map associated ROI histograms as discussed above, has wherein the plurality of pixels are arranged in rows and columns within a pixel array (Neubauer: column 5, lines 52-67; column 6, lines 1-28), as in the claims

Regarding claims 7-8, the Neubauer system, now incorporate the map associated ROI histograms as discussed above, has wherein said selected pixels correspond to individual ones of

Art Unit: 2621

the pixels within the pixel array, said access controller being configured to read the image data associated with the selected pixels out of the image sensor pixel-by-pixel (Neubauer: column 8, lines 12-26), as in the claims.

Regarding claim 11, the Neubauer system, now incorporate the map associated ROI histograms as discussed above, has wherein the map includes coordinates of the selected pixels within the pixel array (Neubauer: column 5, lines 30-46), as in the claim.

Regarding claim 12, the Neubauer system, now incorporate the map associated ROI histograms as discussed above, has wherein the map is a bit-wise map of the pixel array (Neubauer: column 8, lines 13-27), as in the claim.

Regarding claim 13, the Neubauer system, now incorporate the map associated ROI histograms as discussed above, has wherein the map is a reduced resolution bit-wise map of the pixel array (Neubauer: column 5, lines 63-67; column 6, lines 1-29), as in the claim.

Regarding claim 14, the Neubauer system, now incorporate the map associated ROI histograms as discussed above, has wherein the region of interest segments correspond to blocks of pixels each having four corner pixels and the map includes coordinates of two of the corner pixels for each of the blocks of pixels (Neubauer: figure 10b), as in the claim.

Regarding claim 15, the Neubauer system, now incorporate the map associated ROI histograms as discussed above, has wherein the region of interest segments correspond to blocks of pixels each having four corner pixels and the map includes coordinates of one of the corner pixels for each of the blocks of pixels and dimensions of each of the blocks of pixels (Neubauer: figure 10b), as in the claim.

Art Unit: 2621

Regarding claim 16, the Neubauer system, now incorporate the map associated ROI histograms as discussed above, has wherein the region of interest segments correspond to blocks of pixels each having four reduced resolution corner pixels and the map includes coordinates of two of the reduced resolution corner pixels for each of the blocks of pixels (Neubauer: column 5, lines 63-67; column 6, lines 1-29), as in the claim.

Neubauer discloses an optical inspection system (Neubauer: figure 5), comprising: a camera including an image sensor for capturing an image of a target surface having two or more region of interest segments (Neubauer: column 7, lines 35-45) within the field-of-view of the camera and producing image data corresponding to the image (Neubauer: column 3, lines 55-60); and an image processing system connected to the camera to receive and process only the image data associated with the region of interest segments (Neubauer: column 3, lines 61-67), as in claim 17. However, Neubauer doesn't explicitly disclose the use of an ROI map as in the claims. But Neubauer discloses the use of ROI template generation based (Neubauer: column 4, lines 4-28) on ROI histograms (Neubauer: column 4, lines 60-67; column 5, lines 1-46) constructed from PCB marker identification (Neubauer: column 4, lines 37-50) in order to accurately predict and classify irregularly shaped PCB features with optimal results (Neubauer: column 7, lines 15-23), especially since the ROI histograms are evaluated on a global scale in accordance with Euclidean distance parameters corresponding to each respective marker (Neubauer: column 7, lines 55-67; column 8, lines 1-27). Accordingly, given the teaching of the Neubauer ROI histograms, it would have been obvious for one of ordinary skill in the art at the time of the invention to associate the ROI histograms of Neubauer with the claimed ROI maps of the instant invention in order to use said map associated ROI histograms to accurately predict and classify

Art Unit: 2621

irregularly shaped PCB features with optimal results, especially since both would contain the spatial distribution of PCB markers across a field of view of the camera (Neubauer: column 7, lines 35-47). The Neubauer system, now incorporate the map associated ROI histograms as discussed above, has all of the features of claim 17.

Regarding claim 18, the Neubauer system, now incorporate the map associated ROI histograms as discussed above, has Neubauer discloses an optical inspection system (Neubauer: figure 5), comprising: an image sensor including pixels for capturing the image and producing image data corresponding to the image (Neubauer: column 3, lines 55-60); and an access controller configured to retrieve the image data associated with the selected pixels (Neubauer: column 4, lines 1-17), as in claim 18.

Neubauer discloses method for imaging region of interest segments on a target surface (Neubauer: figures 6 and 9), comprising: capturing an image containing pixels (Neubauer: column 3, lines 55-57); storing selected ones of the pixels located in region of interest segments within the image (Neubauer: column 3, lines 58-67); and retrieving image data corresponding only to the image (Neubauer: column 4, lines 63-65: "...extracting the relevant image features from a target image within a ROI...") and associated with the selected pixels (Neubauer: column 4, lines 1-29), as in claim 19. However, Neubauer doesn't explicitly disclose the use of an ROI map as in the claims. But Neubauer discloses the use of ROI template generation based (Neubauer: column 4, lines 4-28) on ROI histograms (Neubauer: column 4, lines 60-67; column 5, lines 1-46) constructed from PCB marker identification (Neubauer: column 4, lines 37-50) in order to accurately predict and classify irregularly shaped PCB features with optimal results (Neubauer: column 7, lines 15-23), especially since the ROI histograms are evaluated on a global

Art Unit: 2621

scale in accordance with Euclidean distance parameters corresponding to each respective marker (Neubauer: column 7, lines 55-67; column 8, lines 1-27). Accordingly, given the teaching of the Neubauer ROI histograms, it would have been obvious for one of ordinary skill in the art at the time of the invention to associate the ROI histograms of Neubauer with the claimed ROI maps of the instant invention in order to use said map associated ROI histograms to accurately predict and classify irregularly shaped PCB features with optimal results, especially since both would contain the spatial distribution of PCB markers across a field of view of the camera (Neubauer: column 7, lines 35-47). The Neubauer method, now incorporate the map associated ROI histograms as discussed above, has all of the features of claim 19.

Regarding claim 20, the Neubauer method, now incorporate the map associated ROI histograms as discussed above, has wherein said retrieving further comprises: storing the image data corresponding to the image (Neubauer: column 3, lines 60-65); and accessing the image data associated with the selected pixels (Neubauer: column 4, lines 5-15), as in the claim.

Regarding claim 21, the Neubauer method, now incorporate the map associated ROI histograms as discussed above, has wherein said retrieving further comprises: reading the image data associated with the selected pixels row-by-row (Neubauer: column 6, lines 1-15), as in the claim.

Regarding claim 22, the Neubauer method, now incorporate the map associated ROI histograms as discussed above, has a step wherein retrieving further comprises: reading the image data associated with the selected pixels pixel-by-pixel (Neubauer: column 8, lines 10-30), as in the claim.

Art Unit: 2621

Regarding claim 23, the Neubauer method, now incorporate the map associated ROI histograms as discussed above, has a step for further comprising: calculating a reset time for each row of the plurality of pixels based on the map (Neubauer: column 6, lines 40-67), as in the claim.

Regarding claim 24, the Neubauer method, now incorporate the map associated ROI histograms as discussed above, has a step further comprising: loading the map into a memory.

Regarding claim 25, the Neubauer method, now incorporate the map associated ROI histograms as discussed above, has a step for transmitting the image data associated with the selected pixels (Neubauer: column 3, lines 50-55), as in the claim.

5. Claims 5-6 and 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Neubauer et al., (hereinafter referred to as “Neubauer”) in view of Burns et al., (hereinafter referred to as “Burns”).

Neubauer discloses a camera (Neubauer: figure 5), comprising: an image sensor including pixels for capturing an image (Neubauer: column 3, lines 55-57) in a field of view (Neubauer: column 6, lines 40-45) and producing image data corresponding to the image (Neubauer: column 3, lines 58-63); a memory storing one or more pre-defined regions of interest within the field of view (Neubauer: column 4, lines 65-67; column 5, lines 1-5: multiple “marker specific ROIs) selected ones of the pixels (Neubauer: column 3, lines 64-67); and an access controller configured to retrieve the image data associated with only (Neubauer: column 4, lines 63-65: “...extracting the relevant image features from a target image within a ROI...” the selected pixels (Neubauer: column 4, lines 1-3), and an access controller configured to retrieve the image data associated with the selected pixels (Neubauer: column 4, lines 1-3), as in claims

Art Unit: 2621

5-6 and 9-10. However, Neubauer doesn't explicitly disclose the use of an ROI map or the specific use of CCDs or CMOS imager sensors as in the claims. But Neubauer discloses the use of ROI template generation based (Neubauer: column 4, lines 4-28) on ROI histograms (Neubauer: column 4, lines 60-67; column 5, lines 1-46) constructed from PCB marker identification (Neubauer: column 4, lines 37-50) in order to accurately predict and classify irregularly shaped PCB features with optimal results (Neubauer: column 7, lines 15-23), especially since the ROI histograms are evaluated on a global scale in accordance with Euclidean distance parameters corresponding to each respective marker (Neubauer: column 7, lines 55-67; column 8, lines 1-27). Accordingly, given the teaching of the Neubauer ROI histograms, it would have been obvious for one of ordinary skill in the art at the time of the invention to associate the ROI histograms of Neubauer with the claimed ROI maps of the instant invention in order to use said map associated ROI histograms to accurately predict and classify irregularly shaped PCB features with optimal results, especially since both would contain the spatial distribution of PCB markers across a field of view of the camera (Neubauer: column 7, lines 35-47), as in the claims 5-6 and 9-10. However, Neubauer fails to disclose the specific use of CCDs or CMOS image sensors, as in the claims. Burns discloses the use of a machine vision application (Burns: column 1, lines 25-35) which discloses the advantageous use of both CCDs (Burns: column 2, lines 12-64) and CMOS image sensors (Burns: column 4, lines 25-40) as conventional imaging means in ASICs (Burns: column 5, lines 15-35) for efficiently processing ROI information in images (Burns: column 4, lines 45-67; column 5, lines 1-6 and 35-67). Accordingly, given this information, it would have been obvious for one of ordinary skill in the art at the time of the invention to incorporate the Burns' teaching of using CCDs and CMOS imaging based sensors

Art Unit: 2621

into the Neubauer camera in order to efficiently process ROI information in the Neubauer application for PCB images. The Neubauer camera, now incorporating the Burns teaching of using CCDs and CMOS image sensors, has all of the features of claims 5-6 and 9-10.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action against amended claim 17. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andy S. Rao whose telephone number is (571)-272-7337. The examiner can normally be reached on Monday-Friday 8 hours.

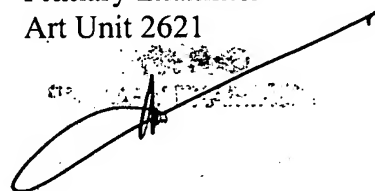
Art Unit: 2621

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mehrdad Dastouri can be reached on (571)-272-7418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Andy S. Rao
Primary Examiner
Art Unit 2621

asr
February 15, 2008

A handwritten signature in black ink, appearing to read 'ASR', is written over a circular stamp. The stamp contains some illegible text, possibly a date or time.